



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

11.9

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/748,565	12/30/2003	Bryan M. White	884.864US1	8030
21186 7590 10/09/2007 SCHWEGMAN, LUNDBERG & WOESSNER, P.A. P.O. BOX 2938 MINNEAPOLIS, MN 55402			EXAMINER IM, JUNGHWA M	
			ART UNIT 2811	PAPER NUMBER
			MAIL DATE 10/09/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/748,565

Applicant(s)

WHITE ET AL.

Examiner

Junghwa M. Im

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-11 and 17-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 22-25 is/are allowed.
- 6) ☒ Claim(s) 7-11 and 17-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 2811

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7-11 and 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dangelo et al (9S 7109581), hereinafter Dangelo in view of Uang et al. (6989325), hereinafter Uang and Brown et al. (US 6340822), hereinafter Brown.

Regarding claims 7, 11 and 17, Fig. 4 of Dangelo shows an integrated circuit package, comprising

a die/IC 402;

a heat sink 404, and

a thermal intermediate portion 408 comprising a plurality of carbon nanotubes (MWCNT), the one end of some nanotubes perpendicularly bonded to the heat sink through a chemical process.

Fig. 4 of Dangelo fails show that a coating of gold on both of the die and the heat sink. Uang discloses an IC package comprising at least two die or substrate each having a coating of gold 32, 54 thereon and Fig. 3. Uang further discloses that the each ends of the carbon nanotubes include an amide and/or thiol based linker (organic moieties) to attach the nanotubes to the metal surfaces (col. 2, lines 58-68). It would have been obvious to one of ordinary skill in the art at the

Art Unit: 2811

time the invention was made to incorporate the teachings of Uang in order to coat both of the die and the heat sink with gold and tether the nanotubes to the metal surfaces for better conductivity.

The combination of Dangelo/Uang fails to show a first and a second thermal intermediate portions. Fig. 6 of Brown shows nanotubes having two portion 4a, 4b and one end bonded to the die 10' and the other end to the substrate 10. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have two portions of second thermal intermediate portions each bonded to a die and a heat sink with the teachings of Brown to improve heat dissipation.

Note that the device of Dangelo could be a DRAM since Dangelo's device is an IC.

Regarding claims 8-10 and 19-21, Uang discloses that the each ends of the carbon nanotubes include an amide and/or thiol based linker (organic moieties) to attach the nanotubes to the metal surfaces (col. 2, lines 58-68).

Regarding claim 18, Dangelo discloses that a die an IC, therefore, it would be a part of the processor.

Allowable Subject Matter

Claims 22-25 are allowed.

Response to Arguments

Art Unit: 2811

Applicant's arguments filed June 27, 2007 have been fully considered but they are not persuasive. The rejection of claims 7-11 and 17-21 stands. And the examiner presents the remarks below in response to Applicant's arguments.

Applicants' main argument is that "Dangelo teaches away from using gold as coating material on the heat sink." However, it is not persuasive. Dangelo merely discloses that "Metal catalyst layer 410 may chosen from among Ti, Co, Cr, Pt, Ni and their alloys. Preferably, metal catalyst layer 410 are Ni and Ni alloys." This disclosure does not assert the Applicant's argument that "Dangelo teaches away from using gold as coating material on the heat sink."

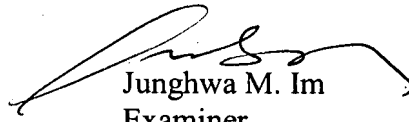
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne A. Gurley can be reached on (571) 272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2811

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Junghwa M. Im
Examiner
Art Unit 2811

jmi